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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/538,730

06/13/2005

Olivier Guerret

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07/22/2009

ARKEMA INC.

PATENT DEPARTMENT - 26TH FLOOR

2000 MARKET STREET

PHILADELPHIA, PA 19103-3222

EXAMINER

BERNSHTEYN, MICHAEL

ART UNIT

PAPER NUMBER

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/538,730	<b>Applicant(s)</b> GUERRET, OLIVIER	
	<b>Examiner</b> MICHAEL M. BERNSHTEYN	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-7,9-11,13 and 17-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 is/are allowed.
- 6) ☒ Claim(s) 1,2,4-7,9,10,13 and 17-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This Office Action follows a response filed on June 25, 2009. Claims 1 and 7 have been amended; claim 8 has been cancelled without prejudice; no claims have been added.
2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 25, 2009 has been entered.
3. Applicant's arguments with respect to claims 1, 2, 4-7, 9, 10, 13 and 17-21 have been considered but are moot in view of the new ground(s) of rejection.
4. Claims 1, 2, 4-7, 9, 10, 13 and 17-21 are pending.

### ***Claim Rejections - 35 USC § 102***

5. The text of this section of Title 35 U.S.C. not included in this action can be found in a prior Office Action.

### ***Claim Rejections - 35 USC § 103***

6. The text of this section of Title 35 U.S.C. not included in this action can be found in a prior Office Action.

Art Unit: 1796

7. Claims 1, 2, 4-6 and 18 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Matyjaszewski et al.

“Gradient copolymers by atom transfer radical polymerization”, J. Phys. Org. Chem., 2000, 13, p. 775-786.

With regard to the limitations of claims 1, 2, 4 and 18, Matyjaszewski discloses that gradient copolymers have a continuous change in composition from one end of the chain to the other. In order to achieve this continuous change in instantaneous composition, all chains must be initiated simultaneously, and must survive until the end of the polymerization. Therefore, a living (ionic) or controlled/living radical polymerization technique must be employed, as the significant presence of chain-breaking reactions would lead to heterogeneity in both composition and molecular weight (page 775, right column through page 776, left column).

Gradient copolymers may be prepared via ATRP copolymerization of two or more monomers with different homopolymerization reactivity ratios (e.g.,  $r_1 \gg r_2$ , where  $r_1$  may be greater than 1 and  $r_2$  may be less than 1). As the differences in the two values of reactivity ratio increase, so does the steepness of the gradient in instantaneous composition (pages 777-778).

Matyjaszewski exemplifies that both gradient copolymers of styrene and acrylonitrile contained 59 mol% acrylonitrile had number average molecular weights of 11,000 and 15,000, and polydispersities 1.15 and 1.08; all these values are within the claimed ranges (page 783, Fig. 13). These copolymers meet the limitations for the specific values for the range of  $Tg_1$  and  $Tg_2$  as per claim 1.

With regard to the limitations of claim 1, Matyjaszewski discloses that the use of nitroxide mediated polymerization has been shown to be effective for synthesis of not only homopolymers and block copolymers, but also random and statistical copolymers of styrene. These copolymers can be formed using nitroxide-mediated CRP. The introduction of new more universal nitroxide mediators will allow for the synthesis of a wide range of gradient copolymers with acrylates and acrylamides (page 779, left column, paragraph "Gradient copolymers from controlled radical polymerizations).

With regard to the limitations of claim 1, Matyjaszewski does not disclose that said copolymer comprising at least one monomer  $M_i$  such that the probability of encountering  $M_i$  in any standardized position  $x$  situated on the polymer chain is nonzero; and wherein said gradient copolymer is soluble or dispersible in both water and in organic solvents.

However, in view of substantially identical monomers, their weight amounts, the obtained copolymer having a number average molecular weight and a polydispersity within the claimed ranges, between Matyjaszewski and instant claims, it is the examiner position that Matyjaszewski's gradient copolymer inherently possesses these properties. Since the USPTO does not have equipment to do the analytical test, the burden is now shifted to the applicant to prove otherwise. **In re Fitzgerald** 619 F 2d 67, 70, 205 USPQ 594, 596 (CCPA 1980).

With regard to the limitations of claims 5 and 6, Matyjaszewski discloses examples of copolymerization of styrene with comonomers such as 4-hydroxystyrene, 4-acetoxystyrene, n-butyl acrylate, butadiene, methyl methacrylate, acrylonitrile,

Art Unit: 1796

vinylpyrrolidone and maleic anhydride (page 779, left column, paragraph "Gradient copolymers from controlled radical polymerizations").

8. Claims 7, 9, 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matyjaszewski et al. as applied to claims 1, 2, 4-6 and 18 above, and further in view of Farcet et al. "Nitroxide-mediated miniemulsion polymerization of n-butyl acrylate: synthesis of controlled homopolymers and gradient copolymers with styrene", Macromolecular Symposia (2002), 182, (3rd IUPAC-Sponsored International Symposium on Free-Radical Polymerization: Kinetics and Mechanism), 2001, 249-260 (see SRNT dated on September 19, 2007, pages 48-49).

With regard to the limitations of claims 7, 9, 10 and 20, Matyjaszewski discloses that the introduction of new more universal nitroxide mediators will allow for the synthesis of a wide range of gradient copolymers with acrylates and acrylamides (page 779, left column). Matyjaszewski exemplifies the simultaneous radical copolymerization of styrene and n-butyl acrylate, and methyl methacrylate and n-butyl acrylate in bulk at 90-110<sup>0</sup>C, which is within the claimed range (pages 780-781, Fig. 5-7).

With regard to the limitations of claims 7, 9, and 10, Matyjaszewski does not disclose the usage of the claimed nitroxide species comprising a phosphonate group, and alkoxyamine.

Farcet discloses that a controlled free-radical homopolymerization of butyl acrylate and its copolymerization with styrene have been studied in aqueous miniemulsion, using an acyclic  $\beta$ -phosphonylated nitroxide as a mediator, the N-tert-butyl-N-(1-diethylphosphono-2,2-dimethylpropyl) nitroxide, also called SG1, and

Art Unit: 1796

alkoxyamine. Polymerization kinetics have been studied and characterization of the (co)polymers has been performed, demonstrating the successful synthesis of well-defined poly(butyl acrylate) homopolymers and poly(butyl acrylate-co-styrene) gradient copolymers (abstract).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the mixture of the above mentioned phosphonate-containing nitroxide and alkoxyamine as taught by Farcet in Matyjaszewski's process for producing a gradient copolymer with reasonable expectation of success in order to obtain well-defined poly(butyl acrylate) homopolymers and poly(butyl acrylate-co-styrene) gradient copolymers (Farcet, abstract), and thus to arrive at the subject matter of instant claims 7, 9, 10 and 20.

9. Claims 13 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Matyjaszewski et al. "Gradient copolymers by atom transfer radical polymerization", J. Phys. Org. Chem., 2000, 13, p. 775-786, as applied to claims 1, 2, 4-6 and 18 above, and further in view of Matyjaszewski et al. (U. S. Patent 5,807,937).

The disclosure of Matyjaszewski's reference resided in § 7 is incorporated herein by reference.

With regard to the limitations of claims 13 and 21, Matyjaszewski'Chem does not disclose a paint, adhesive, glue or cosmetic formulation comprising the gradient copolymer of claim 1, wherein said formulation is an aqueous-based formulation.

With regard to the limitations of claims 13 and 21, Matyjaszewski'937 discloses that the novel (co)polymers, including gradient copolymers are useful in a wide variety

Art Unit: 1796

of applications (for example, as **adhesives**, in contact lenses, as detergents, diagnostic agents and supports therefor, dispersants, emulsifiers, elastomers, engineering resins, viscosity index improvers, in ink and imaging compositions, as leather and cement modifiers, lubricants and/or surfactants, with **paints** and coatings, as paper additives and coating agents, in textiles, as water treatment chemicals, in the chemical and chemical waste processing, composite fabrication, **cosmetics**, hair products, personal care products in plastics compounding as, for example, an antistatic agent, in food and beverage packaging, pharmaceuticals, etc. (col. 6, lines 45-61).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the gradient copolymers of in a wide variety of applications as taught by Matyjaszewski'937, such as paint, adhesive, glue or cosmetic formulation with reasonable expectation of success because analogous gradient copolymers were already successfully used for these applications (Matyjaszewski'937, col. 6, lines 45-61), and thus to arrive at the subject matter of instant claims 13 and 21.

10. Claims 1, 2, 4-7, 9, 10, 13 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Nesvadba et al. (U.S. Patent 6,262,206), for the rationale recited in paragraph 3 of Office Action dated October 4, 2007, and comments below.

11. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Nesvadba et al. (U.S. Patent 6,262,206), for the rationale recited in paragraph 6 of Office Action dated March 26, 2008, and comments below.



Art Unit: 1796

12. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, for rationale recited in paragraph 17 of Office Action dated September 8, 2008.

### ***Response to Arguments***

13. Applicant's arguments filed on June 25, 2009 have been fully considered but they are not persuasive.

14. It appears that the focal Applicants argument resides in the in the contention that the main point of difference between Applicant's claims and the art is that Applicant's unique copolymer has both water and organic solvent solubility, and that this dual solubility was not known or expected from the art, and could certainly not have been predicted (pages 7-9), it is worth to mention that Nesvadba clearly discloses that the process may be carried out in the presence of **an organic solvent** or in the presence of **water or in mixtures of organic solvents and water** (col. 9, lines 62-66).

Furthermore, in view of substantially identical monomers, their weight amounts, the obtained copolymer having a number average molecular weight and a polydispersity within the claimed ranges, between Nesvadba and instant claims, it is the examiner position that Nesvadba's copolymer inherently possesses these properties. Since the USPTO does not have equipment to do the analytical test, the burden is now shifted to the applicant to prove otherwise. *In re Fitzgerald* 619 F 2d 67, 70, 205 USPQ 594, 596 (CCPA 1980).

Art Unit: 1796

15. In response to Applicants arguments that the Nesvadba's reference teaches a gradient copolymer (pages 7-8, the bridging paragraph), though with no teaching or suggestion of how such a gradient polymer might be made (page 9, the last paragraph), it is noted that the most claims recite the copolymer (claims 1, 2, 4-6, 13, 17-19 and 21), not the process. Nevertheless, it is noted that Nesvadba clearly discloses that the present invention encompasses in the synthesis novel **gradient copolymers** (col. 12, lines 56-59). It is well settled that "an applied reference may be relied upon for all that it would have reasonably suggested to one of ordinary skill in the art, including not only preferred embodiment, but less preferred and even non preferred". *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989).

16. In response to Applicants arguments that Matyjaszewski's reference fails to teach or suggest all of Applicant's claim elements, thus fails to provide a *prima facie* case of anticipation because the Matyjaszewski's reference fails to teach or suggest that the copolymer have both the claimed Tg and wt%, as well as one monomer being hydrophilic; nor that the resulting copolymer is soluble or dispersible in both water and organic solvent (page 9, 2<sup>nd</sup> paragraph), it is noted that as it was already mentioned in the previous Office action, Matyjaszewski discloses that gradient copolymers have a continuous change in composition from one end of the chain to the other. In order to achieve this continuous change in instantaneous composition, all chains must be initiated simultaneously, and must survive until the end of the polymerization. Therefore, a living (ionic) or controlled/living radical polymerization technique must be employed,

Art Unit: 1796

as the significant presence of chain-breaking reactions would lead to heterogeneity in both composition and molecular weight (page 775, right column through page 776, left column). Gradient copolymers may be prepared via ATRP copolymerization of two or more monomers with different homopolymerization reactivity ratios (e.g.,  $r_1 \gg r_2$ , where  $r_1$  may be greater than 1 and  $r_2$  may be less than 1). As the differences in the two values of reactivity ratio increase, so does the steepness of the gradient in instantaneous composition (pages 777-778). Matyjaszewski exemplifies the simultaneous radical copolymerization of styrene and n-butyl acrylate, and methyl methacrylate and n-butyl acrylate in bulk at 90-110°C, which is within the claimed range (pages 780-781, Fig. 5-7). Therefore it is the Examiner position that Matyjaszewski's reference anticipates the claimed invention.

17. In response to Applicants arguments that the Matyjaszewski's reference does show gradient copolymers, including the styrene/acrylonitrile (example, page 783, Figure 3) but however, neither styrene nor acrylonitrile is a hydrophilic monomer, thus fails to meet that claim element (page 9, 3<sup>rd</sup> paragraph), it is noted that "an applied reference may be relied upon for all that it would have reasonably suggested to one of ordinary skill in the art, including not only preferred embodiment, but less preferred and even non preferred". *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989).

18. In response to Applicants arguments that the Matyjaszewski's reference does show gradient copolymers having residual nitroxide groups in the copolymer as in

Art Unit: 1796

Applicant's amended claim (page 9, 2<sup>nd</sup> paragraph), please, see paragraph 7 of current Office Action.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL M. BERNSHTEYN whose telephone number is (571)272-2411. The examiner can normally be reached on M-Th 8-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael M. Bernshteyn/  
Examiner, Art Unit 1796

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Application/Control Number: 10/538,730

Page 12

Art Unit: 1796

/David Wu/

Supervisory Patent Examiner, Art Unit 1796